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## Sonic Impedance Technique Detects Flaws in Polyurethane Foam Spray-On Insulation

Many techniques of nondestructive testing have been applied with limited success to the problem of detecting voids and unbonded areas within a polyurethane foam insulation layer. Techniques using microwave, X-ray, or neutron radiography; ultrasonic pulse echoes; electrostatic field intensity; low-frequency sound velocity; sonic-brush noise generation and microphone pickup; and optical absorptance/reflectance have been rejected because of lack of sensitivity or high cost.

The sonic impedance technique, on the other hand, has been found capable of detecting voids and unbonded regions as small as 1 inch in diameter by 0.03 inch thick. In addition, the technique has the following advantages: 1) the measurements can be made either manually or by automatic scanning; 2) the readout may be made directly by meter or recorder, providing more precise measurement than systems that require subjective judgement on the part of the operator; and 3) the technique may be used even after the application of a protective coating over the insulation layer.

### Note:

The following documentation may be obtained from:

Clearinghouse for Federal Scientific  
and Technical Information  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$0.65)

Reference: NASA-TM-X-53852 (N69-35245)  
Development of Nondestructive Test Device  
for Evaluation of 3/4-Inch Thick Poly-  
urethane Spray-On Foam Insulation (SOFI)  
on the Saturn S-II Stage.

### Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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